GROUP 52B

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

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GENERAL INFORMATION

M2521000100819

- The driver's and front passenger's air bags and seat belts with pre-tensioner are standard equipped on all vehicles.
- To improve safety against side impact collisions, optional side-airbags and curtain air bags are available to all the models.
- An inflator that does not contain sodium azide is adopted for all types of the air bag modules.

SRS FRONT AIR BAG

The SRS is designed to supplement the front seat belts. It reduces injury to the front passenger(s) by deploying air bag(s) in case of a frontal collision.

SRS SIDE-AIRBAG

Side-airbag systems in the front seats are activated when side collision applied to the vehicle exceed criteria to protect the occupants' upper bodies.

SRS CURTAIN AIR BAG

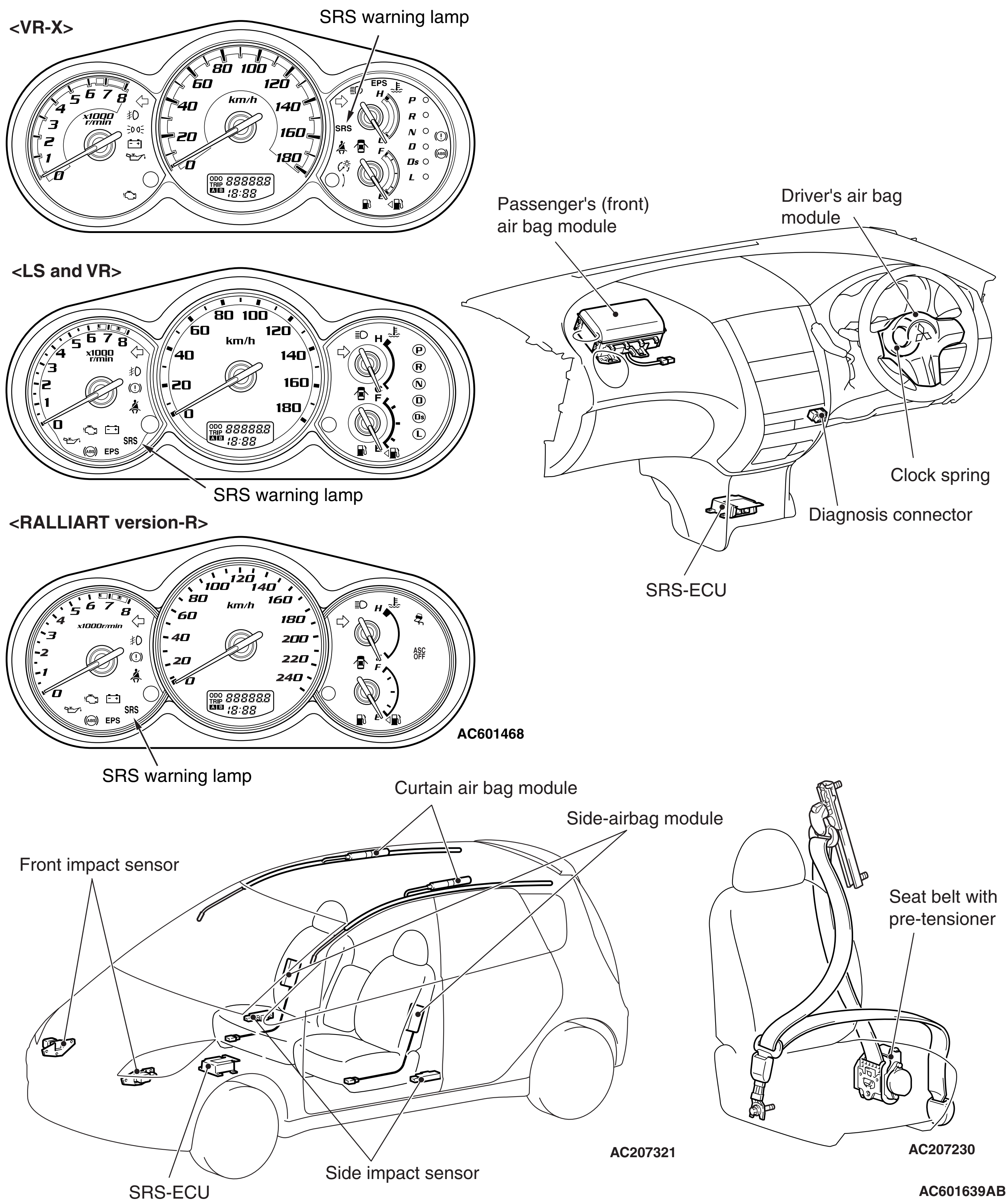
The curtain air bag systems are activated when side collision applied to the vehicle exceed criteria, to protect the heads of the occupants in the front and rear seats.

SEAT BELT WITH PRE-TENSIONER

The seat belts with pre-tensioner work simultaneously with the SRS. The pre-tensioner takes up seat belt slack immediately when a collision takes place, restraining the front passengers sooner than the SRS. This prevents the passengers from moving forward.

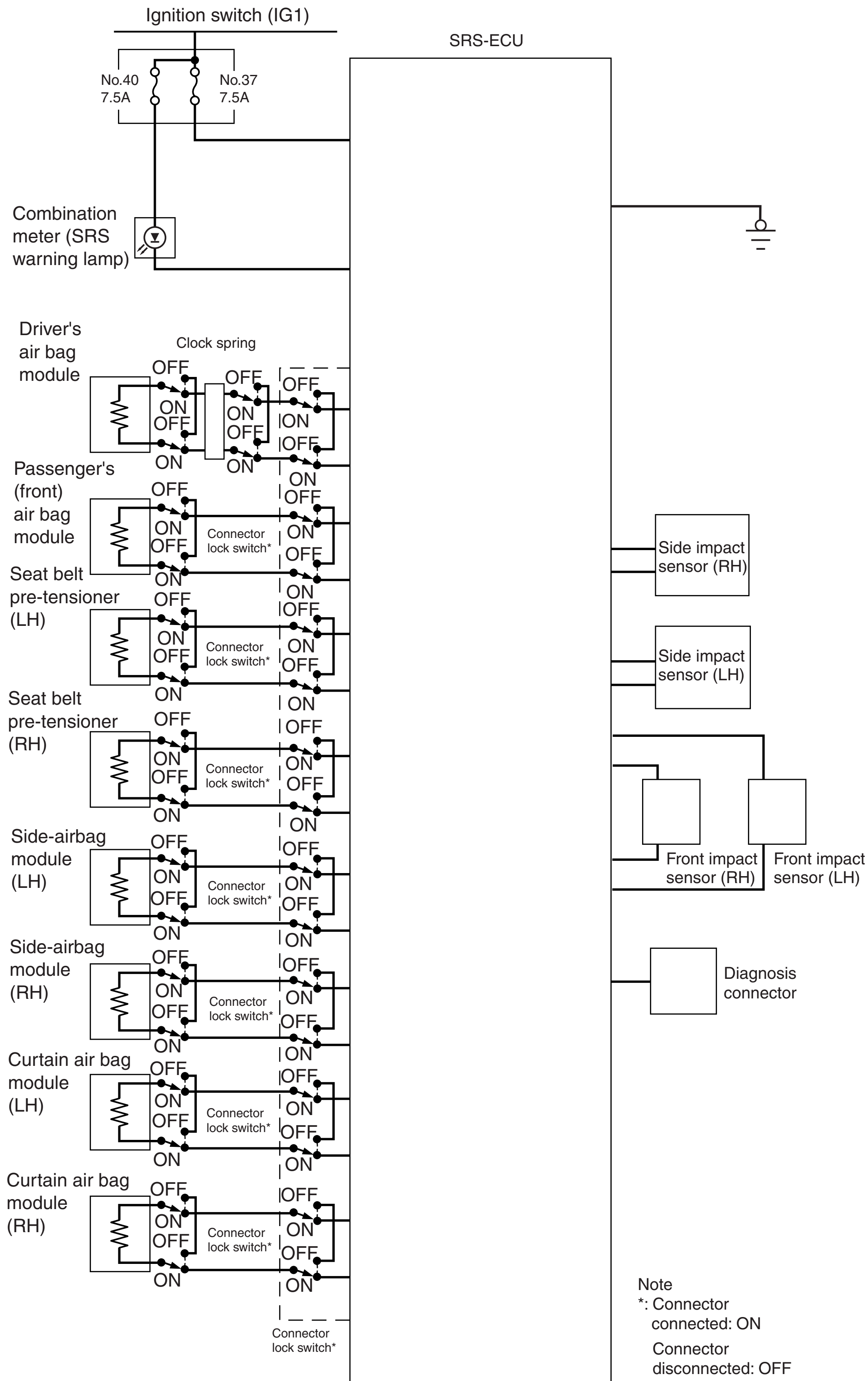
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CONSTRUCTION DIAGRAM



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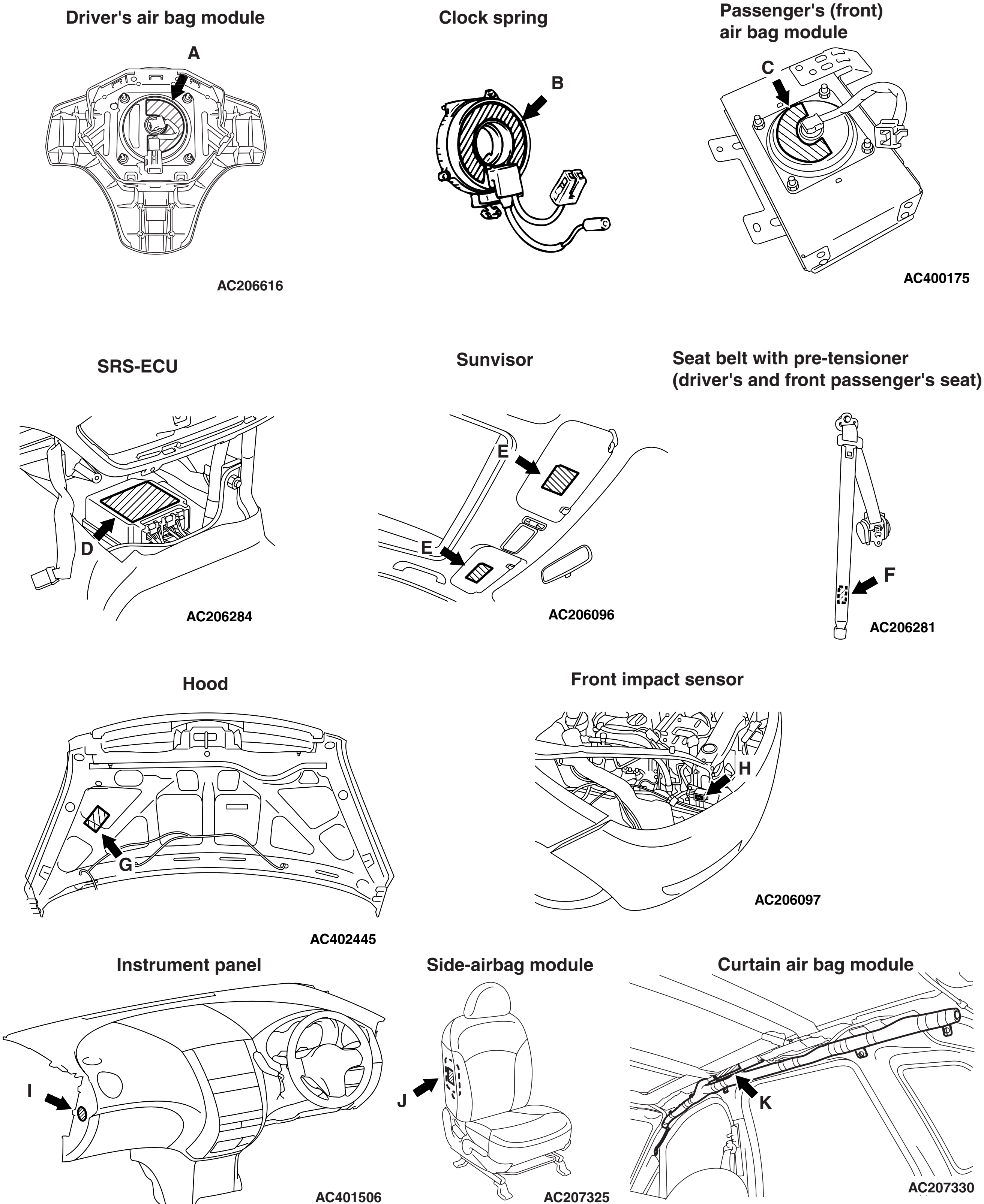
SRS SYSTEM CIRCUIT DIAGRAM



AC401544 AB

CAUTION LABELS

Labels to indicate cautions regarding the handling and the services of SRS air bag are attached on the position shown in the following illustration.



AC510120AB

Label contents	
A	DANGER FLAMMABLE MATERIAL TO PREVENT PERSONAL INJURY. DO NOT DISMANTLE, INCINERATE, OR BRING INTO CONTACT WITH ELECTRICITY. STORE BELOW 200°F (93°C). READ SERVICE MANUAL FOR DETAIL.
B	CAUTION: SRS CLOCK SPRING THIS IS NOT A REPAIRABLE PART. IF DEFECTIVE, REPLACE ENTIRE UNIT ACCORDING TO THE SERVICE MANUAL INSTRUCTIONS. TO RE-CENTRE: ROTATE CLOCKWISE UNTIL TIGHT. THEN ROTATE IN OPPOSITE DIRECTION ROUGHLY 3 3/4 TURNS AND ALIGN ARROWS >><<.
C	DANGER FLAMMABLE MATERIAL TO PREVENT PERSONAL INJURY. DO NOT DISMANTLE, INCINERATE, OR BRING INTO CONTACT WITH ELECTRICITY. STORE BELOW 200°F (93°C). READ SERVICE MANUAL FOR DETAIL.
D	CAUTION: DO NOT DISASSEMBLE OR DROP. IF DEFECT REFER TO SERVICE MANUAL.
E	<Driver’s side> WARNING • DEATH OR SERIOUS INJURY can occur. • ALWAYS use SEAT BELT and CHILD SEAT. • DO NOT sit or lean unnecessarily close to the air bag. • DO NOT place or install any objects over the air bag or between the air bag and yourself. <Passenger’s side> WARNING • DEATH OR SERIOUS INJURY can occur • DO NOT place rear-facing child seat on this seat with airbag.
F	DANGER: SEAT BELT PRETENSIONER DO NOT DISASSEMBLE OR IMPACT REFER TO SERVICE MANUAL FOR INSTRUCTIONS, HANDLING, STORAGE AND DISPOSAL PROCEDURES.
G	WARNING THIS VEHICLE HAS AN AIR BAG SYSTEM. REFER TO SERVICE MANUAL BEFORE SERVICING OR DISASSEMBLING UNDERHOOD COMPONENTS. READ THE "SRS" SECTION OF MANUAL FOR IMPORTANT INSTRUCTIONS. IMPROPER SERVICE PROCEDURES CAN RESULT IN THE AIR BAG FIRING OR BECOMING INOPERATIVE, POSSIBLY LEADING TO INJURY.
H	CAUTION: DO NOT DISASSEMBLE OR DROP.

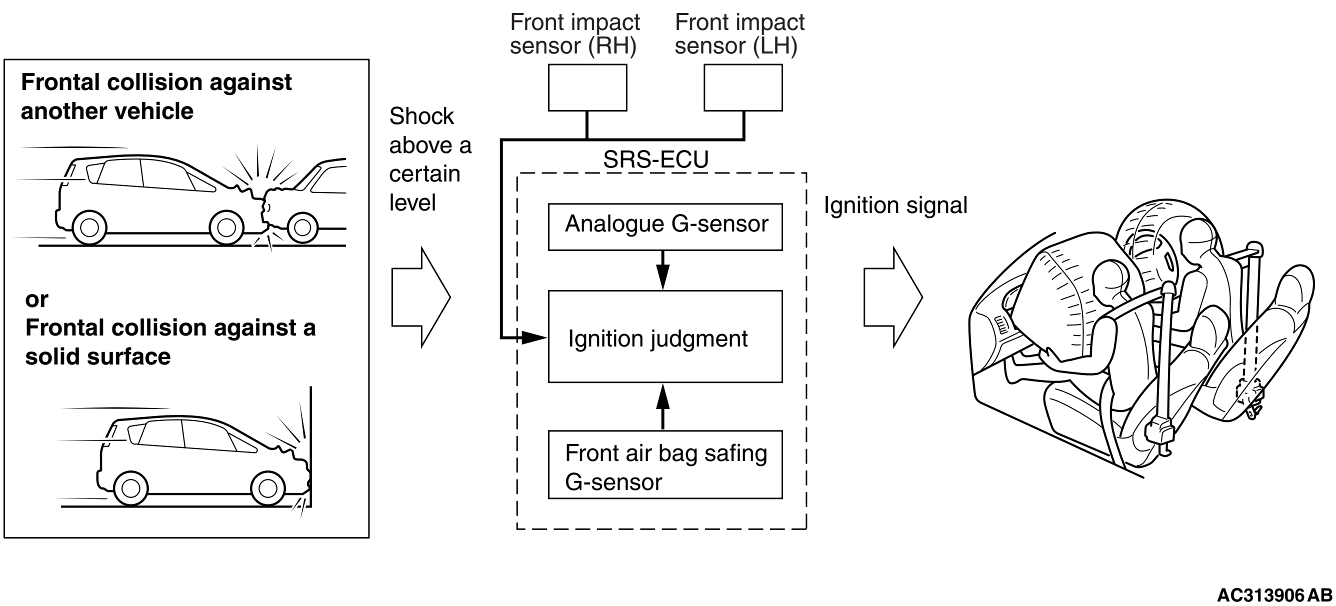
Label contents	
I  AC300151	
J	WARNING FLAMMABLE/EXPLOSIVE SRS AIR BAG MODULE TO AVOID SERIOUS INJURY: • DO NOT REPAIR, DISASSEMBLE OR TAMPER. • AVOID CONTACT WITH FLAME OR ELECTRICITY. • DO NO DIAGNOSIS/USE NO TEST EQPT OR PROBES. • STORE BELOW 200°F (93°C). • BEFORE DOING ANY WORK INVOLVING MODULE, READ SERVICE MANUAL FOR IMPORTANT FURTHER DATA.
K	WARNING • THIS AIRBAG MODULE CAN NOT BE REPAIRED. SEE SERVICE MANUAL FOR INSTRUCTION (ON DIAGNOSIS AND REPLACEMENT) • DO NOT DIAGNOSE USING ELECTRICALLY POWERED TEST EQUIPMENT OR PROBING DEVICES. • TAMPERING OR MISHANDLING CAN RESULT IN PERSONAL INJURY. • STORE THE REMOVED AIRBAG MODULE WITH THE PAD OR COVER SURFACE UP. (REFER TO SERVICE MANUAL FOR SPECIAL HANDLING OR STORAGE.) • DO NOT STORE ABOVE 200°F (93°C).

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SYSTEM OPERATION

FRONT AIR BAG AND SEAT BELT WITH PRE-TENSIONER

M2521000700059

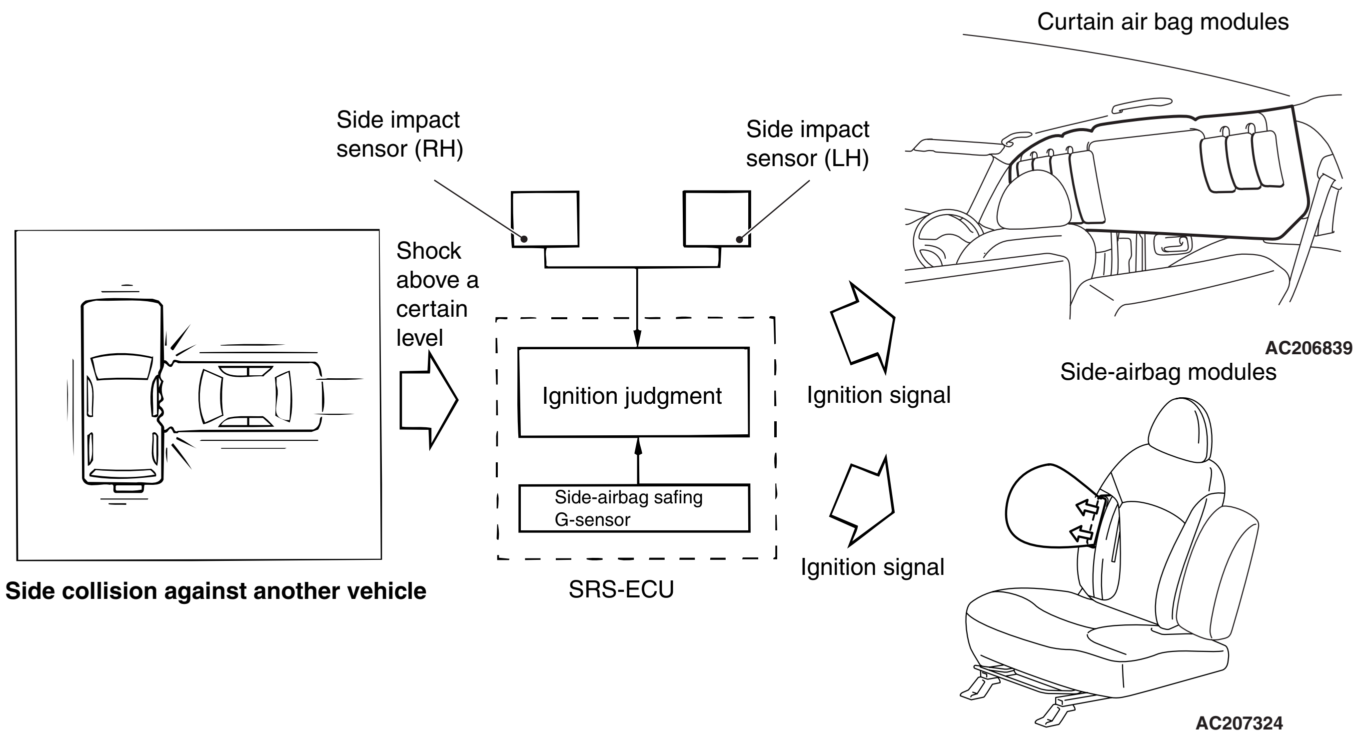


In case of a frontal collision, if the front impact sensor in the engine compartment, the analogue G-sensor in the SRS-ECU and the front air bag safing sensor simultaneously detect an impact that exceed a certain threshold (turn ON), the SRS-ECU sends an ignition signal to the air bag modules (squibs) and seat belt pre-tensioners (squibs) on the driver and passenger sides, thus inflating the air bags and operating the seat belt pre-tensioners.

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SIDE AND CURTAIN AIR BAGS

M2521000800045



AC208121AC

In case of a side collision, if an impact that based on criteria is simultaneously detected by the side impact sensors installed in a centre pillar and respectively and by the side-airbag safing G-sensor (the sensors turn ON), the SRS-ECU sends an ignition signal to the side-airbag module and curtain air bag module on the relevant side to inflate them.

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SYSTEM CONSTRUCTION

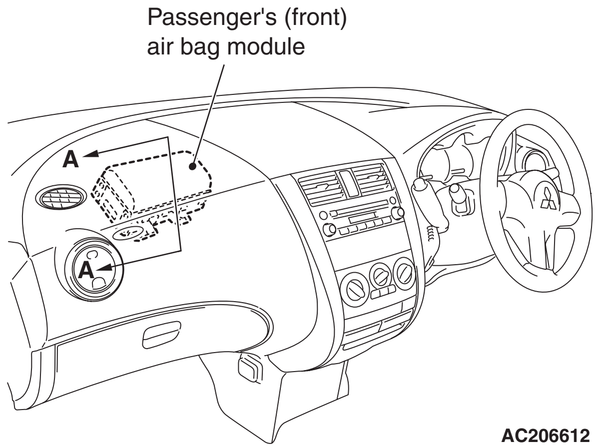
DRIVER'S SIDE AIR BAG MODULE

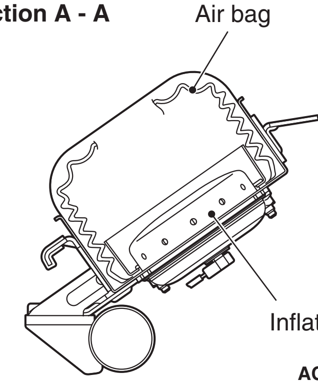
M2521002000216

Refer to GROUP 37, Steering wheel P.37-5.

PASSENGER'S (FRONT) AIR BAG MODULE

M2521003000349





AC207778AE

Passenger’s (front) air bag module consists of the air bag, inflator, and fixing brackets.
The air bag is made of nylon and inflated by the gas supplied from the inflator. As the driver’s body sinks into the inflated air bag, the air bag deflates while discharging the gas from two side vents to absorb the impact.

SIDE-AIRBAG MODULE

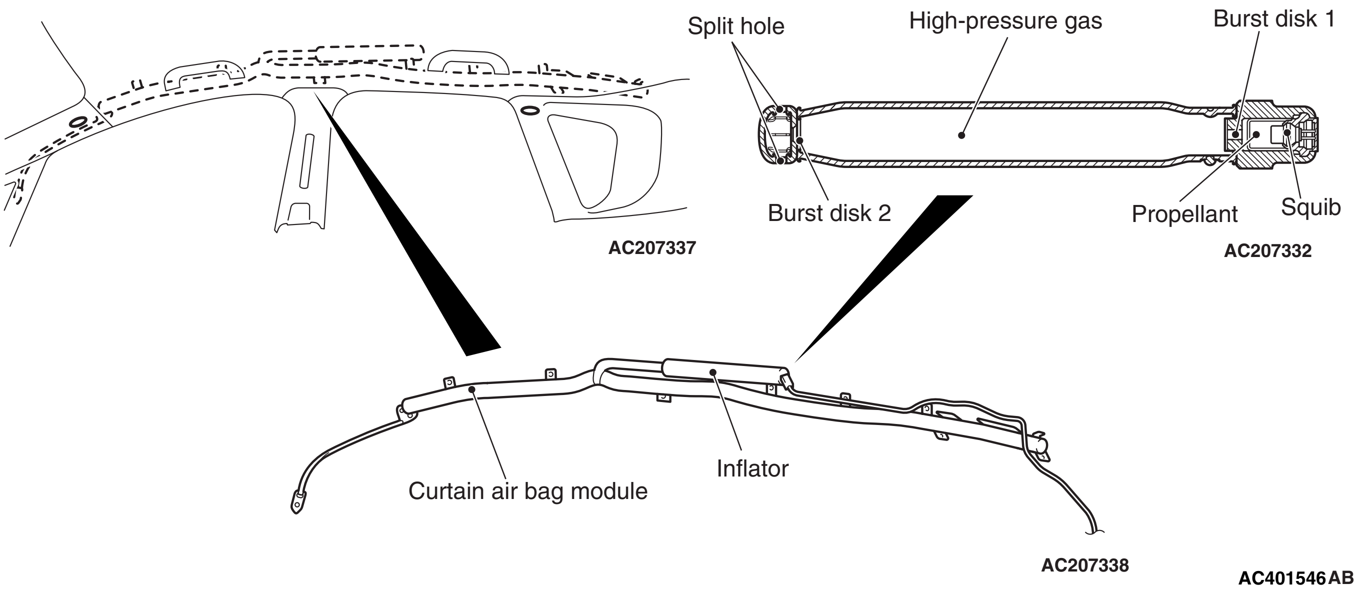
M2521004000223

The side-airbag module structure is the same as that for 2001 PAJERO.

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CURTAIN AIR BAG MODULE

M2521000500088



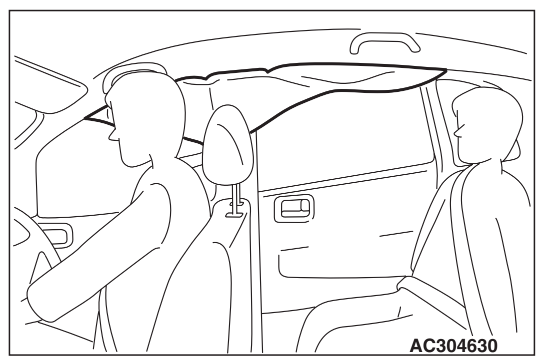
The curtain air bag module consists of an air bag, an inflator, and the fixing gear relating to those parts, and is installed in the roof side sections (from the driver's and the passenger's front pillars to the rear pillars).
The air bag is made from nylon with the inside coated with silicon, and housed in the roof side sections, folded up compactly.
The inflator is of a hybrid type filled with high-pressure gas (major component: argon). When current passes through the squib to ignite the igniter powder, burst disk 1 bursts. Then, the combustion of the igniter powder increases the pressure of the filler gas to burst disk 2, letting the gas out of the split hole.

CURTAIN AIR BAG DEPLOYMENT IGNITION



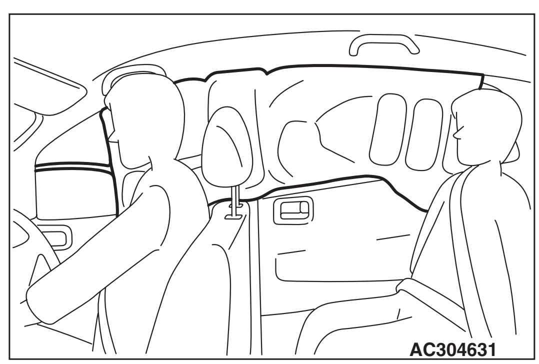
if an impact in a side collision is detected by the rear side impact sensor installed inside a inner quarter panel and by the side-airbag safing G-sensor integrated in the SRS-ECU, the SRS-ECU sends an ignition signal to the squib of the relevant curtain air bag module. When this ignition signal passes through the squib, the inflator generates gas.

INFLATING



The air bag starts to appear pushing away a headlining.

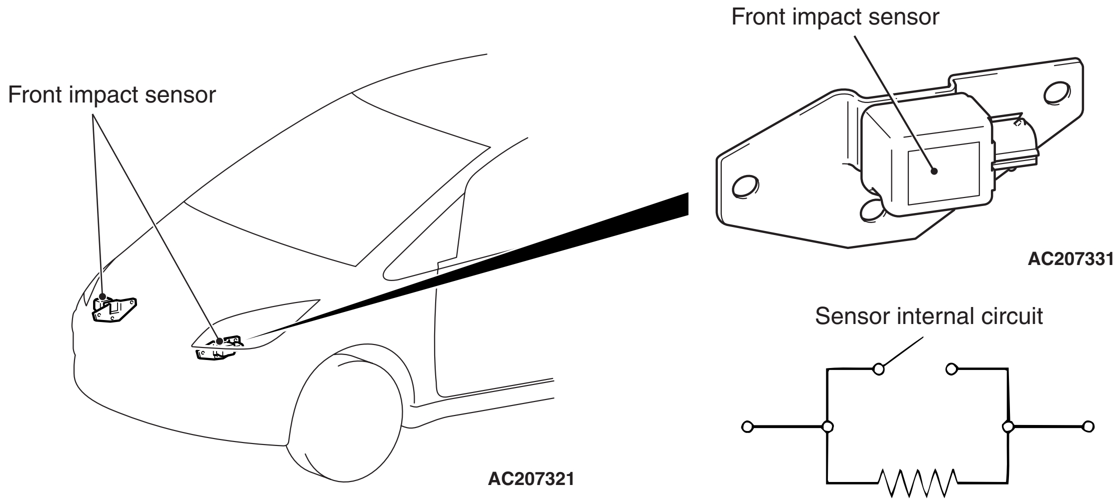
COMPLETION OF INFLATION



The air bag fully inflates to protect the heads of the occupants in the front and rear seats.

FRONT IMPACT SENSOR

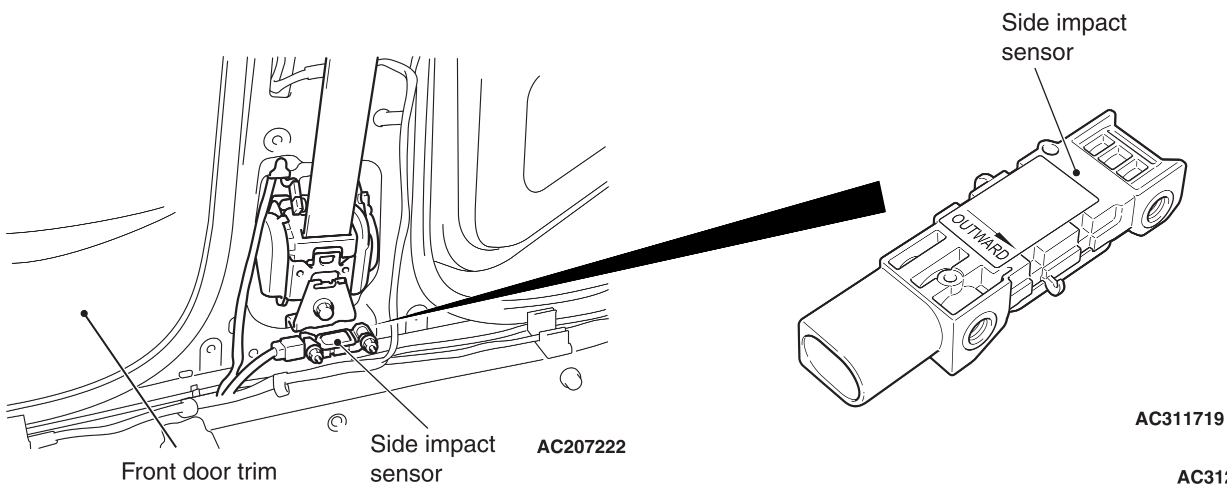
M2521005000174



Front impact sensor is installed outside of the headlamp support panel in the engine compartment. When the front impact sensor detects an impact during collision, the contact in the sensor turns ON and sends output signal to the SRS-ECU. For diagnosis, the resistance of the front impact sensor is connected in parallel with the contact point.

SIDE IMPACT SENSOR

M2521006000144

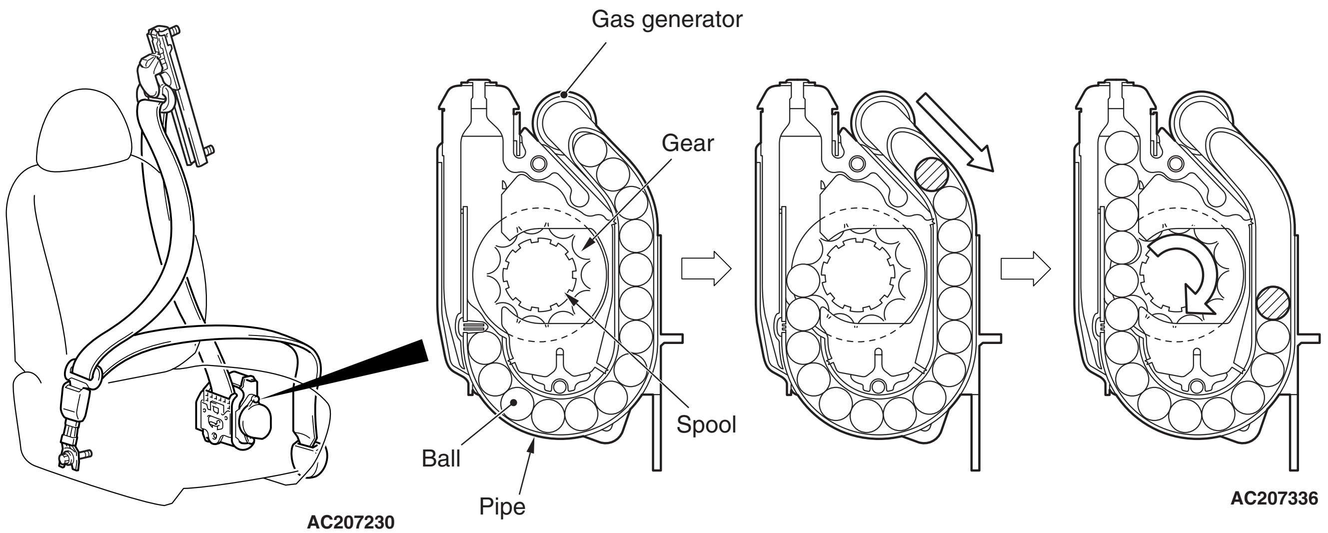


The side impact sensor is installed in the lower parts of the centre pillars and contains an analogue G-sensor.

The side impact sensor transmits coded acceleration data to the SRS-ECU. Based on the data, the SRS-ECU then determines if the side and/or curtain air bags should be inflated, and sends an ignition signal. The side impact sensor also diagnoses its own components, and sends a diagnosis code to the SRS-ECU if a problem occurs.

SEAT BELT WITH PRE-TENSIONER

M2521008000195



The seatbelt incorporating the pre-tensioner automatically winds the seatbelt upon front impact to reduce forward shifting of the passenger.
Upon front impact the pre-tensioner ignites the gas generator and emits gas with the SRS-ECU signal when the front impact sensor, attached to the front of the body, detects an impact that exceeds the permissible limit. By this gas pressure, a ball moves in the pipe and rotates the gear. This gear rotation operates the spool in the direction of retracting the belt, and the webbing is retracted.

SRS-ECU

M2521007000482

The SRS-ECU incorporates an analogue G-sensor and safing G-sensor for frontal collisions.
In frontal collisions, the driver's and front passenger's air bags deploy only when both the analogue and safing G-sensors detect simultaneously a collision-induced G of a level exceeding the threshold as in the case with the conventional system.
The SRS-ECU is provided with the following capabilities:

- Backup power supply in case of power failure in collisions: Backup capacitor
- Boosting function in case of battery voltage drop: DC-DC converter
- Self-diagnosis function to avoid system's operation errors and improve its reliability

⚠ CAUTION

Never disassemble the SRS-ECU.

DIAGNOSIS FUNCTION

The SRS-ECU has the following functions to make system check using M.U.T.-III easy.

- Diagnosis code set
- Service data output

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DIAGNOSIS CODE SET

The SRS-ECU diagnoses the following items and stores a diagnosis code in the non-volatile memory (EEPROM*1) when a problem is detected. Therefore, the memory is not deleted after a battery terminal is disconnected. (The diagnosis code memory can be deleted by the M.U.T.-III).

CODE NO.	MAJOR CONTENTS OF DIAGNOSTICS	
1A	Front impact sensor LH system	Short circuit in the sensor
1B		Open circuit in the sensor
1C		Short circuit in the power supply
1D		Short circuit in the earth
2A	Front impact sensor RH system	Short circuit in the sensor
2B		Open circuit in the sensor
2C		Short circuit in the power supply
2D		Short circuit in the earth
3A*3	Curtain air bag squib (RH) short-circuited	
3B*3	Curtain air bag squib (RH) open-circuited	
3C	Curtain air bag squib (RH) activating circuit short-circuited	
3D	Curtain air bag squib (RH) activating circuit open-circuited	
3E	Curtain air bag squib (RH) drive circuit (power supply side) short-circuited	
3F	Curtain air bag squib (RH) drive circuit (earth side) short-circuited	
4A*3	Curtain air bag squib (LH) short-circuited	
4B*3	Curtain air bag squib (LH) open-circuited	
4C	Curtain air bag squib (LH) activating circuit short-circuited	
4D	Curtain air bag squib (LH) activating circuit open-circuited	
4E	Curtain air bag squib (LH) drive circuit (power supply side) short-circuited	
4F	Curtain air bag squib (LH) drive circuit (earth side) short-circuited	
14	Analog G-sensor malfunction	
15	Safing G-sensor short-circuited (for frontal collision)	
16	Safing G-sensor open-circuited (for frontal collision)	
17	Safing G-sensor malfunction (for side collision)	
21*3	Driver's air bag squib short-circuited	
22*3	Driver's air bag squib open-circuited	
24*3	Passenger's (front) air bag squib short-circuited	
25*3	Passenger's (front) air bag squib open-circuited	
26*3	Driver's pre-tensioner squib short-circuited	
27*3	Driver's pre-tensioner squib open-circuited	
28*3	Passenger's (front) pre-tensioner squib short-circuited	
29*3	Passenger's (front) pre-tensioner squib open-circuited	
31	SRS-ECU capacitor circuit voltage too high	

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CODE NO.	MAJOR CONTENTS OF DIAGNOSTICS
32	SRS-ECU capacitor circuit voltage too low
34*2	SRS-ECU connector lock out of order
35	Ignition of the air bag completed
39	Simultaneous deployed
41*2	Power supply voltage (IG1 (A) voltage) drops abnormally.
42*2	Power supply voltage (IG1 (B) voltage) drops abnormally.
43*2	SRS warning lamp circuit open-circuited
44*2	SRS warning lamp circuit malfunction
45	SRS-ECU non-volatile memory (EEPROM) and A/D converter system
51	Driver's air bag squib activating circuit short-circuited
52	Driver's air bag squib activating circuit open-circuited
54	Passenger's (front) air bag squib activating circuit short-circuited
55	Passenger's (front) air bag squib activating circuit open-circuited
56	Driver’s seat belt pre-tensioner (squib ignition drive circuit) system detected short
57	Driver’s seat belt pre-tensioner (squib ignition drive circuit) system detected open
58	Passenger’s seat belt pre-tensioner (squib ignition drive circuit) system detected short
59	Passenger’s seat belt pre-tensioner (squib ignition drive circuit) system detected open
61	Driver's air bag squib drive circuit (power supply side) short-circuited
62	Driver's air bag squib drive circuit (earth side) short-circuited
64	Passenger's (front) air bag squib drive circuit (power supply side) short-circuited
65	Passenger's (front) air bag squib drive circuit (earth side) short-circuited
66	Driver's pre-tensioner squib (power supply side) short-circuited
67	Driver's pre-tensioner squib (earth side) short-circuited
68	Passenger's (front) pre-tensioner squib drive circuit (power supply side) short-circuited
69	Passenger's (front) pre-tensioner squib drive circuit (earth side) short-circuited
71*3	Side-airbag squib (RH) short-circuited
72*3	Side-airbag squib (RH) open-circuited
73	Side-airbag squib (RH) drive circuit shorted
74	Side-airbag squib (RH) drive circuit open
75	Side-airbag squib (RH) drive circuit (power supply side) shorted
76	Side-airbag squib (RH) drive circuit (earth side) shorted
79	Side impact sensor (LH) communication error
81*3	Side-airbag squib (LH) shot-circuited
82*3	Side-airbag squib (LH) open-circuited
83	Side-airbag squib (LH) drive circuit shorted
84	Side-airbag squib (LH) drive circuit open
85	Side-airbag squib (LH) drive circuit (power supply side) shorted
86	Side-airbag squib (LH) drive circuit (earth side) shorted
89	Side impact sensor (RH) communication error

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CODE NO.	MAJOR CONTENTS OF DIAGNOSTICS
91*2	Side impact sensor (LH) voltage error
92	G-sensor of side impact sensor (LH) failure
93	Side impact sensor (LH) communication impossible
94*2	Side impact sensor (RH) voltage error
95	G-sensor of side impact sensor (RH) failure
96	Side impact sensor (RH) communication impossible

NOTE:

- ***1: Electrically Erasable Programmable ROM*
- **2: This diagnosis code memory will be automatically cleared from the memory and the SRS warning lamp will be switched off when the system returns to normal condition.*
- **3: The diagnosis codes will remain in memory and the SRS warning lamp will be switched off if the system returns to normal condition.*

SERVICE DATA OUTPUT

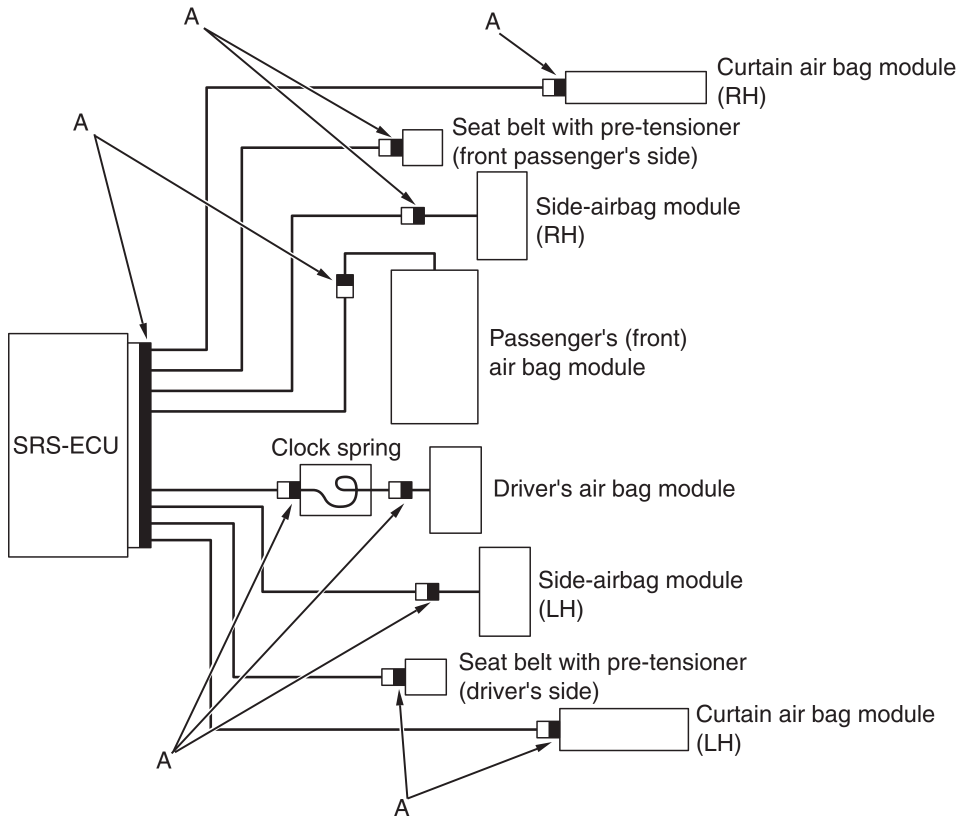
When the SRS-ECU detects a problem, it stores a diagnosis code and the duration that the problem has lasted in the non-volatile memory. In addition, how often a diagnosis code and duration are cleared by the M.U.T.-III are stored in the non-volatile memory as a reference for service work. This data can be read by the M.U.T.-III.

No.	Service Data Item	Applicability
92	Number indicating how often the memory is cleared	Maximum time to be stored: 250 times
93	How long a problem has lasted (How long takes from the occurrence of the problem until the first air bag squid Igniting signal)	Maximum time to be stored: 9999 minutes (approximately 7days)
94	How long a problem has lasted (How long from the first air bag squib igniting signal until now)	

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SRS AIR BAG SPECIAL CONNECTOR

M2521009000187

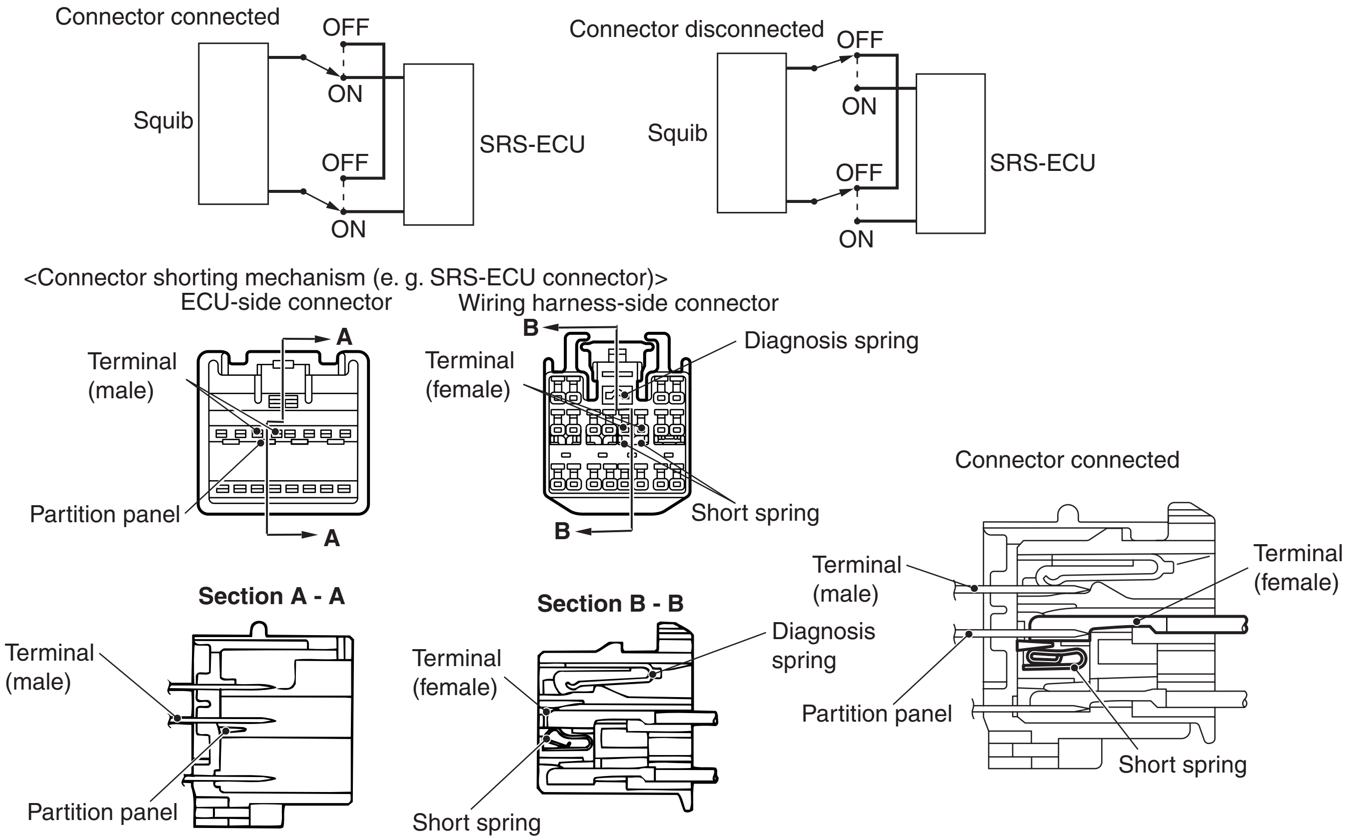


AC304767AE

To enhance the system reliability, the connector engagement check mechanism is used. And a connector lock switch is integrated in the SRS-ECU connector, the air bag module connectors, the clock spring connector, the seat belt pre-tensioner connectors (black connector "A" shown in the illustration above).

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SQUIB CIRCUIT CONNECTOR LOCK SWITCH



AC300257AC

⚠ CAUTION

When the connector is disconnected, it is normal for short-circuiting to occur between the connector terminals.

- The diagnosis spring is assembled on the SRS-ECU wiring harness-side connector. When the ECU-side connector is connected to the SRS-ECU wiring harness-side connector, the diagnosis spring is disengaged from the terminal to short the circuit between the ECU-side connector terminals. The connector engagement is detected electrically by flowing the monitor current to this circuit.
- This mechanism automatically short-circuits the power supply side terminal and earth side terminal of the air bag when the connector is disconnected. A short spring is incorporated in the connector to short-circuit the power supply side terminal and earth side terminal of the air bag (no potential difference between the two terminals) and prevent flow of current by static electricity to the squib.